

REMARKS

The Examiner has rejected claims 1-3, 5-13, 15-29, 31-37, 39, and 40 under 35 USC 103(a) as being unpatentable under 35 USC 103(a) over Miyamoto et al. (US Patent No. 5,114,224) in view of Connelly et al. (US Pub. No. 2003/0202156) and Pinhanez et al. (US Patent No. 6,431,711). The Examiner has also rejected claim 30 under 35 USC 103(a) as being unpatentable over Miyamoto in view of Connelly and Pinhanez and Raskar et al. (US Patent No. 6,793,350). The Examiner has also rejected claim 4 under 35 USC 103(a) as being unpatentable over Miyamoto in view of Connelly and Pinhanez and in further view of Machtig et al. (US Patent No. 5,278,596).

The independent claims have been amended in response to the Examiner's rejections from the previous office action.

Claim 1 as amended recites:

An image projection system comprising,

a projection unit that comprises an image projector, said projection unit having an input configured to receive data representing an image that is predistorted such that, when projected upon a surface, the resulting image is substantially undistorted;

at least one mount for mounting said projection unit, and

a mechanism coupled with said mount for providing translational movement and rotational movement for changing at least **one of a position and an orientation of the projection unit in three dimensional space**;

where said data representing an image that is predistorted is varied in accordance **with a current position and orientation of said projection unit in three dimensional space** such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted.

Support for claim 1 can be found at least on page 8, lines 23-25, page 7, lines 20-23, and page 7, lines 26-29, of the specification as filed. No new matter is added.

The Examiner has argued claim 1 is unpatentable in part because Miyamoto discloses a positioning system comprising a projection unit comprising a projector for projecting a

distorted image. However, Miyamoto does not disclose or suggest what claim 1 as amended recites in part:

where said data representing an image that is **predistorted** is varied in accordance **with a current position and orientation of said projection unit in three dimensional space** such that a resulting image projected on a surface from the current position and orientation of the projection unit is **substantially undistorted**.

Miyamoto does not disclose the use of data representing an image that is predistorted, or does it disclose producing an undistorted image by the same method as claim 1 of the present application.

The Examiner has referenced Connelly to argue that Connelly teaches providing translational movement for adjusting the position of a projection unit to allow the projection unit to produce a substantially undistorted image on a surface. Nonetheless, unlike the present application, Connelly discloses in paragraph [0032]:

The first rail system includes a **first rail subsystem** upon which the first platform is translationally slidable, and a **second rail subsystem** upon which the third platform is translationally slidable.

However, claim 1 of the present application recites:

a mechanism coupled with said mount for providing **translational movement and rotational movement** for changing at least one of a position and an orientation of the projection **unit in the three dimensional space**.

Consequently, combining Connelly with Miyamoto would not reproduce what is recited in claim 1.

The Examiner has also asserted that Pinhanez also teaches distorting the image before projection as the present application so that when the image arrives on any surface it will appear properly undistorted on the surface such as a table or other irregular surface. However, Pinhanez discloses in col. 3 lines 21-26:

To create undistorted images on table 140, floor 160 and wall 195, the **multiple-surface display projector 120 will use an undistorted image and**

distort this image so that, when the image arrives at the surface onto which it is displayed, it will be undistorted when displayed.

However, the use of the multiple-surface display projector in Pinhanez does not disclose or suggest:

providing translational movement and rotational movement for changing at least one of a position and an orientation of the projection unit in three dimensional space;

where said data representing an image that is predistorted is varied in accordance **with a current position and orientation of said projection unit in three dimensional space** such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted.

Pinhanez's use of a multi-surface display projector does not disclose or suggest what is recited in part in claim 1. Moreover, Pinhanez discloses in col. 8 lines 5-12:

One way that multiple-surface display projector method 223 calibrates multiple-surface display projector 200 for a particular destination area is to allow an operator to see a displayed image that is a representation of a calibration image. If distortion is seen in the displayed image, the operation can interact with GUI 227 to adjust the parameters of the projected image until distortion is no longer seen.

Unlike claim 1, Pinhanez discloses adjusting the parameters of the image itself instead of the projection unit to create the undistorted image.

Therefore, for the reasons given above, combining Miyamoto in view of Connelly and Pinhanez does not make claim 1 obvious, and claim 1 and its dependent claims are in condition for allowance at least for these reasons alone.

The Examiner has used the same reasons as claim 1 to reject claim 24. Claim 24 recites similar language as claim 1 as shown in part below:

receiving data representing an image that is predistorted such that, when projected upon a surface, the resulting image is substantially undistorted;

selecting a projection unit comprised of at least an image projector for projecting the distorted image and at least one mount for mounting the projection unit; and,

moving the at least one image projector by operating a mechanism coupled with said mount comprising the at least one image projector mounted on a moveable portion of the mechanism, **where the mechanism is adapted for providing translational movement and rotational movement of the at least one image projector by changing at least one of a position and an orientation of the projection unit in three dimensional space** such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted; and,

varying the data representing the image in accordance with a current position and orientation of said projection unit in three dimensional space such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted.

As for claim 1, support for claim 24 can also be found at least on page 8, lines 23-25, page 7, lines 20-23, and page 7, lines 26-29, of the specification as filed. As argued for claim 1, Miyamoto in view of Connelly and Pinhanez does not disclose or suggest what is claimed in claim 24, and claim 24 and its dependent claims are in condition for allowance at least for these reasons alone.

The Examiner rejected claim 30 for the same reasons as claim 1, and because Raskar teaches a method for projecting an undistorted image upon a curved image with more than one projector, which includes projecting a structure light pattern. Claim 30 recites similar language as claim 1, and recites in part:

receiving data representing an image that is predistorted such that, when projected upon a surface, the resulting image is substantially undistorted;

selecting a projection unit comprised of at least an image projector for projecting the distorted image and at least one mount for mounting the projection unit;

moving the at least one image projector by operating a mechanism coupled with said mount comprising the at least one image projector mounted on a moveable portion of the mechanism, **where the mechanism is adapted for providing translational movement and rotational movement of the at least one image projector by changing at least one of a position and an orientation of the projection unit in three dimensional space;**

varying the data representing the image in accordance with a current position and orientation of said projection unit in three dimensional space such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted.

In contrast, Raskar discloses in col. 3 lines 32-35:

The quadratic transfer function according to our invention means an image transfer function from a first view, e.g. a projector output image, to a second view, e.g., a camera input image, via a quadratic surface.

Nevertheless, Raskar does not disclose or suggest what claim 30 recites in part. Therefore, in addition to the reasons argued for claim 1, Miyamoto in view of Connelly, and Pinhanez and in further view of Raskar does not make claim 30 and its dependent claims unpatentable, and claim 30 and its dependent claims are in condition for allowance at least for these reasons alone.

The Examiner has also rejected independent claims 31-35, 37, and 39-40 for the same reasons as independent claims 1 and 24. Independent claims 31-35, 37, and 39-40 all recite similar language as claims 1 and 24. Claims 31-32, and 34 all recite in part:

receiving data representing an image that is predistorted such that, when projected upon a surface, the resulting image is substantially undistorted;

varying the data representing the image in accordance **with a current position and orientation of said projection unit in three dimensionally space** such that a resulting image projected on a surface from the current position and orientation of the projection unit is substantially undistorted

Therefore, for reasons mentioned before, claims 31-32, and 34 and their dependent claims are in condition for allowance.

Claims 33 recites in part:

wherein the mount adapted for mounting a projection unit is configured to provide at least rotational and translational movement of the image projector **by changing at least one of a position and an orientation of the projection unit in three dimensional space.**

Claim 35 similarly recites in part:

where the mounting means is coupled to positioning means for providing translational movement and rotational movement **by changing at least one of a position and orientation of the projection means in three dimensional**

space to produce a substantially undistorted image from the distorted image.

As such, for the reasons argued above for claims 1 and 24, claims 33 and 35 are similarly in condition for allowance at least for these reasons alone.

Similar to claims 1 and 24, claim 37 similarly recites in part:

at least one image projector mounted to at least one mount that is coupled to a **mechanism providing translational movement and rotational movement by changing at least one of a position and an orientation of the projection unit in three dimensional space** for positioning the at least one image projector to produce a substantially undistorted image from the distorted image.

Therefore, claim 37 and its dependent claim is also in condition for allowance at least for this reason alone.

As claims 1 and 24, claim 40 similarly recites in part:

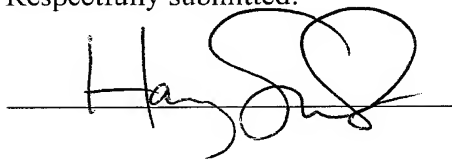
to cause the projection unit to provide the substantially undistorted image by changing at least one of a position and an orientation of the projection unit in three dimensional space.

Consequently, claim 40 is similarly in condition for allowance.

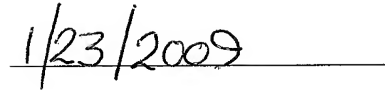
The Examiner also rejected claim 4 as being unpatentable over Miyamoto in view of Connelly and Pinhanez and in further view of Machtig et al.. However, claim 4 is dependent on claim 1, which is now in condition for allowance. Therefore, the combination of Miyamoto, Connelly, and Pinhanez in further view of Machtig does not make claim 4 unpatentable, and claim 4 is also in condition for allowance.

Based on the above arguments the references cited cannot be found to disclose or suggest the subject matter found in claims 1-13, 15-37, and 39-40. The Examiner is respectfully requested to reconsider and remove the rejections of claims 1-13, 15-37, and 39-40 and to allow all of the pending claims as now presented for examination. Should any unresolved issue remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Respectfully submitted:



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